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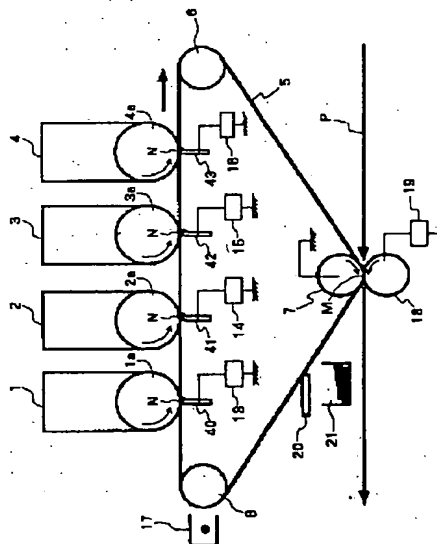
(54) IMAGE FORMING DEVICE

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(57) Abstract:

PROBLEM TO BE SOLVED: To obtain an excellent image free from the image defect by preventing the separation discharge or the abnormal discharge from occurring in primary transfer nip parts.

SOLUTION: This image forming device is, let respectively adopting elastic transfer blade in the plate shape 40, 41, 42 and 43, whose resistance is adjusted so as to become 1×10^1 to $1 \times 10^{12} \Omega \text{cm}$, as a primary transfer bias applying member which abut on the rear side of an intermediate transfer belt 5 in the primary transfer nip part N so as to bring the surface side of the belt 5 into contact with photosensitive drums 1a, 2a, 3a and 4a and apply the primary transfer bias onto the belt 5. In such a manner, an area where the electric field is effected by the primary bias in the vicinity the primary transfer nip part N is narrowed.



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CLAIMS

[Claim(s)]

[Claim 1] In the image formation equipment which imprints the primary toner image formed on the image support to an endless-like middle imprint belt in the primary imprint sections, imprints the secondary aforementioned toner image on this middle imprint belt to imprint material in the secondary imprint sections, and performs image formation in contact with the tooth-back side of the aforementioned middle imprint belt, this middle imprint hair side of belt side side is contacted to the aforementioned image support in the primary aforementioned imprint sections. It has a primary imprint bias impression member for impressing primary imprint bias to the aforementioned middle imprint belt. the aforementioned primary imprint bias impression member Image formation equipment with which a volume resistivity is characterized by what consists of plate-like part material by which resistance adjustment was carried out, and which has elasticity, or a sheet-like member at 10¹-10¹²-ohmcm.

[Claim 2] The surface electrical resistance by the side of the tooth back of the aforementioned middle imprint belt which contacts the aforementioned primary imprint bias impression member is 10⁸. Image formation equipment according to claim 1 characterized by what is been more than omega**.

[Claim 3] Form the toner image of two or more colors one by one on the one aforementioned image support, and impress primary imprint bias to the aforementioned primary imprint bias impression member in the primary imprint sections, and on the aforementioned middle imprint belt, one by one, imprint the primary toner image of the aforementioned two or more colors, and it is piled up. Image formation equipment according to claim 1 or 2 characterized by what the piled-up toner image of the aforementioned two or more colors is put in block in the secondary imprint sections, and the 2nd order is imprinted for to imprint material.

[Claim 4] The aforementioned image support which supports the electrostatic latent image of the arbitrary colors according to image information on a front face, It has two or more image formation units equipped with a development means to develop the aforementioned electrostatic latent image as a toner image, at least. Arrange each aforementioned image support of each aforementioned image formation unit to a single tier, and each aforementioned image support is made to contact the aforementioned middle imprint hair side of belt side side in the primary imprint sections, respectively. Impress primary imprint bias to the aforementioned primary imprint bias impression member in the primary aforementioned imprint sections of each aforementioned image support, pile up the toner image of a different color formed in each aforementioned image support, respectively one by one on the aforementioned middle imprint belt, and it is imprinted the 1st [in all] order. Image formation equipment according to claim 1 or 2 characterized by what the toner image of two or more colors piled up in the secondary imprint sections is put in block, and the 2nd order is imprinted for to imprint material.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to image formation

equipments, such as a copying machine which performs image formation with an electrophotography method, a printer, and facsimile.

[0002]

[Description of the Prior Art] As two or more colors or the full color image formation equipment of an electrophotography method, it responds for every color, two or more photoconductor drums are arranged, and the image formation equipment of composition of making the toner image of each color formed on each photoconductor drum pile up mutually one by one on imprint material or a middle imprint object, and forming a color picture is proposed.

[0003] As this kind of image formation equipment, as shown, for example in drawing 5, the photoconductor drums 1a, 2a, 3a, and 4a as an image support are arranged at the single tier at four image formation units 1, 2, 3, and 4, respectively, and black, a Magenta, cyanogen, and the toner image of yellow are formed in each photoconductor drums 1a, 2a, 3a, and 4a, respectively.

[0004] As shown in each image formation units 1, 2, and 3 and 4 at drawing 6 (drawing 6 shows the image formation unit 1), the electrification machine 30, the aligner 31, and the 32 or primary developer imprint cleaning blade 34 are arranged around photoconductor drum 1a. Also in the image formation units 2, 3, and 4, it is the same composition.

[0005] The primary imprint rollers 9, 10, 11, and 12 are in contact with each photoconductor drums 1a, 2a, 3a, and 4a of the image formation units 1, 2, 3, and 4 through the endless-like middle imprint belt 5, respectively in the primary imprint nip section N.

[0006] Each photoconductor drums 1a, 2a, 3a, and 4a are the OPC photo conductors of negative polarity in this conventional example. Extension ***** of the middle imprint belt 5 is carried out between the 6 or secondary drive roller imprint opposite roller 7 and the tension roller 8, and it rotates in the direction of an arrow by the drive of the drive roller 6. As a middle imprint belt 5, what prepared the good resin layer of a mold-release characteristic on the substratum of resin films, such as 100-200 micrometers in thickness, about [volume-resistivity 10¹¹-10¹⁶ohmcm] PVdF (polyvinylidene fluoride), a polyamide, a polyimide, PET (polyethylene terephthalate), and a polycarbonate, and the rubber of 0.5-2mm thick intensity can be used.

[0007] Moreover, the electric discharge machine 17 and the secondary imprint cleaning blade 20 are installed in the outside of the middle imprint belt 5. The primary imprint bias power supply 13, 14, 15, and 16 is connected to the primary imprint rollers 9, 10, 11, and 12, respectively. The secondary imprint roller 18 by which the primary imprint bias power supply 19 was connected to the secondary imprint opposite roller 7 through the middle imprint belt 5 in the secondary imprint nip section M is contacted.

[0008] For an ASUKA C degree of hardness, 30-60 degrees and a volume resistivity are [the primary imprint rollers 9, 10, 11, and 12] 10⁵. It is a low resistance roller below 10⁵ohmcm. The secondary imprint roller 18 is installed in the secondary imprint opposite roller 7 (middle imprint belt 5) free [attachment and detachment].

[0009] Next, image formation operation by this image formation equipment is explained.

[0010] First, after carrying out the rotation drive of the photoconductor drum 1a of the image formation unit 1 and charging the front face in negative polarity uniformly with the electrification vessel 30, picture exposure according to the image information of black is performed by the aligner 31, and an electrostatic latent image is formed. And by the development sleeve 33 of a developer 32, the toner t of negative polarity is made to adhere to the aforementioned electrostatic latent image by the reversal development, and a visible image is formed as a toner image of black.

[0011] The primary toner image of this black is imprinted on the rotating middle imprint belt 5 with the primary imprint roller 9 with which the primary imprint bias of straight polarity was impressed in the primary imprint nip section N. It is failed to scratch [the primary imprint cleaning blade 34] the primary transfer residual toner which remains on photoconductor drum 1a after a primary imprint, and they are collected by the waste toner bottle 35.

[0012] The middle imprint belt 5 with which the toner image of black was imprinted rotates to the image formation unit 2 side. Also in photoconductor drum 2a of the image formation unit 2, the toner image of the Magenta formed like the above piles up on the toner image of the

black on the middle imprint belt 5, and is imprinted in the primary imprint nip section N.
[0013] You make it pile up each other's cyanogen and toner image of yellow which were hereafter formed by the photoconductor drums 3a and 4a of the image formation units 3 and 4 on the black by which the superposition imprint was similarly carried out on the middle imprint belt 5, and the toner image of a Magenta one by one, and a full color toner image is formed on the middle imprint belt 5. And the secondary imprint roller 18 and the secondary imprint opposite roller 7 which impressed grounding or suitable bias to the tooth back on the imprint material P front face conveyed by the secondary imprint nip section M between the middle imprint belts 5 are used as a counterelectrode to predetermined timing, a full color toner image bundles up with the secondary imprint roller 18 with which the imprint bias of straight polarity was impressed, and the 2nd order is imprinted.

[0014] It is failed to scratch [the secondary imprint cleaning blade 20] the secondary transfer residual toner which remains on the middle imprint belt 5 after a secondary imprint, and they are collected by the waste toner bottle 21. Moreover, the middle imprint belt 5 is discharged with the electric discharge vessel 17 after a secondary imprint, and the next image formation operation is equipped with it.

[0015] The imprint material P in which the full color toner image was formed is discharged outside, after being conveyed by fixing equipment (un-illustrating) and carrying out heat fixing.

[0016]

[Problem(s) to be Solved by the Invention] By the way, like the above-mentioned conventional image formation equipment, when the primary imprint rollers 9, 10, 11, and 12 are used as an impression member of primary imprint bias, as shown in drawing 7 (drawing image formation unit 1), the electric field E by primary imprint bias act on the outside near [which contacts photoconductor drum 1a] the primary imprint nip section N in the latus range. Moreover, since the primary imprint roller 9 separates from the rear face of the middle imprint belt 5 gradually, it becomes easy to generate ablation electric discharge between the rear faces of the middle imprint belt 5. For this reason, by generating of this ablation electric discharge, the toner image formed on the middle imprint belt 5 is disturbed, and partially, a toner image will become poor [pictures, such as condensation or the lost so-called dot picture, and a TORIASHI picture,], and will appear.

[0017] Furthermore, this electric field E act also in the opening which photoconductor drum 1a and middle imprint belt 5 front face divide into an acting [the electric field E by the primary imprint bias to the primary imprint roller 9 / in the large range]-out of the primary imprint nip section N sake. For this reason, the unusual electric discharge by this opening is promoted by this electric field E, imprint efficiency differs in the place where this unusual electric discharge occurred, and the place which did not occur, and this will become poor [pictures, such as the so-called rough skin picture,], and will appear.

[0018] Moreover, when the primary imprint rollers 9, 10, 11, and 12 are used as an impression member of primary imprint bias, as shown in drawing 7 (drawing image formation unit 1), it is necessary like the above-mentioned conventional image formation equipment to press the primary imprint roller 9 by the predetermined energization force to photoconductor drum 1a by the primary imprint nip section N, and to obtain the nip width of face of a grade. Therefore, a toner condenses in the primary imprint nip section N, and it becomes easy to generate the so-called inside omission picture.

[0019] Then, this invention prevents generating of ablation electric discharge near the primary imprint nip section, or unusual electric discharge, and makes light the press between the primary imprint bias impression member in the primary imprint nip section, and a photoconductor drum, and aims at offering the image formation equipment which can acquire the good picture with a poor picture which is not:

[0020]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention imprints the primary toner image formed on the image support to an endless-like middle imprint belt in the primary imprint sections. In the image formation equipment which imprints the secondary aforementioned toner image on this middle imprint belt to imprint material in the secondary imprint sections, and performs image formation in contact with the

tooth-back side of the aforementioned middle imprint belt, this middle imprint hair side of belt side side is contacted to the aforementioned image support in the primary aforementioned imprint sections. It has a primary imprint bias impression member for impressing primary imprint bias to the aforementioned middle imprint belt. the aforementioned primary imprint bias impression member The volume resistivity is characterized by the plate-like part material which has elasticity or sheet-like members by which resistance adjustment was carried out being consisted of by 101-1012-ohmcm.

[0021] Moreover, the surface electrical resistance by the side of the tooth back of the aforementioned middle imprint belt which contacts the aforementioned primary imprint bias impression member is 108. Image formation equipment according to claim 1 characterized by what is been more than omega**.

[0022] Moreover, form the toner image of two or more colors one by one on the one aforementioned image support, and impress primary imprint bias to the aforementioned primary imprint bias impression member in the primary imprint sections, and on the aforementioned middle imprint belt, one by one, imprint the primary toner image of the aforementioned two or more colors, and it is piled up. It is characterized by putting in block the piled-up toner image of the aforementioned two or more colors in the secondary imprint sections, and imprinting the 2nd order to imprint material.

[0023] Moreover, the aforementioned image support which supports the electrostatic latent image of the arbitrary colors according to image information on a front face, It has two or more image formation units equipped with a development means to develop the aforementioned electrostatic latent image as a toner image, at least. Arrange each aforementioned image support of each aforementioned image formation unit to a single tier, and each aforementioned image support is made to contact the aforementioned middle imprint hair side of belt side side in the primary imprint sections, respectively. Impress primary imprint bias to the aforementioned primary imprint bias impression member in the primary aforementioned imprint sections of each aforementioned image support, pile up the toner image of a different color formed in each aforementioned image support, respectively one by one on the aforementioned middle imprint belt, and it is imprinted the 1st [in all] order. It is characterized by putting in block the toner image of two or more colors piled up in the secondary imprint sections, and imprinting the 2nd order to imprint material.

[0024]

[Embodiments of the Invention] Hereafter, the form of operation of this invention is explained based on a drawing.

[0025] <Form 1 of operation> Drawing 1 is the outline block diagram showing the image formation equipment concerning the form 1 of operation of this invention. In addition, the same sign is given to the same member as the image formation equipment of the conventional example shown in drawing 5, and the overlapping explanation is omitted.

[0026] the image formation equipment of the form of this operation -- a primary imprint -- a member -- the composition and image formation operation of an except are the same as that of the image formation equipment of the conventional example shown in drawing 5, and explain only a primary imprint bias impression member with the form of this operation

[0027] With the form of this operation, the imprint blades 40, 41, 42, and 43 of the tabular which has elasticity as a each primary imprint bias impression member of the image formation units 1, 2, 3, and 4 were used.

[0028] The imprint blades 40, 41, 42, and 43 are a volume resistivity 108 Blades of HIDORINGOMU with a thickness of about 2mm which carried out resistance adjustment are consisted of by omegacm grade. As each imprint blades 40, 41, 42, and 43 are shown in drawing 2 (drawing imprint blade 40 of the image formation unit 1), it has fixed to the L character set iron 44 with the adhesives which carried out electric conduction processing, and the primary imprint bias power supply 13 is connected to the L character set iron 44. The primary imprint bias power supply 13 impresses the imprint bias of straight polarity to the L character set iron 44 with the form of this operation.

[0029] Moreover, with the form of this operation, the volume resistivity uses the resin film of a polyimide which adjusted the surface electrical resistance of about 1013ohmcm and a tooth back (primary imprint bias impression side) to 1011ohm** grade by 100 micrometers in the

circumference of 400mm, and thickness as a middle imprint belt 5. That is, in order to form surface potential which holds a toner on the middle imprint belt 5 in order to suppress toner spilling in the time of a primary imprint, resistance used the higher middle imprint belt 5. [0030] Therefore, in order to acquire sufficient primary imprint current, it is necessary to impress higher primary imprint bias. It was made to impress the voltage of 1kV to each imprint blades 40, 41, 42, and 43 in the form of this operation from the each primary imprint bias power supply 13, 14, 15, and 16 (potential of each photoconductor drums 1a, 2a, 3a, and 4a at this time, the non-exposing section : -600 V, the exposure section : -200 V). Therefore, it is easy to generate electric discharge in the opening near the primary imprint nip section N.

[0031] With the gestalt of this operation, however, by having used the imprint blades 40, 41, 42, and 43 of a tabular as a primary imprint bias impression member Since it becomes the composition which approaches rapidly to the middle imprint belt 5 which the imprint blade 40 rotates in the primary imprint nip section N at the time of the primary imprint of a toner image, and is left rapidly as shown in drawing 3 (drawing imprint blade 40 of the image formation unit 1) Compared with the case of the imprint roller (refer to drawing 7) of the above-mentioned conventional example, the range on which the electric field E by primary imprint bias act becomes narrow.

[0032] For this reason, promotion of the unusual electric discharge by the opening between photoconductor drum 1a and the middle imprint belts 5 could be suppressed, and generating with poor pictures, such as the so-called rough skin picture, has been prevented. [near the primary imprint nip section N]

[0033] Moreover, as shown in drawing 3 , compared with the case of the imprint roller (refer to drawing 7) of the above-mentioned conventional example, the range by which exfoliation electric discharge is generated between the imprint blade 40 and the middle imprint belt 5 also becomes narrow by approaching rapidly to the middle imprint belt 5 which the imprint blade 40 rotates in the primary imprint nip section N at the time of the primary imprint of a toner image, and separating rapidly.

[0034] For this reason, the toner image has prevented generating with poor pictures, such as condensation or the lost so-called dot picture, and a TORIASHI picture, partially.

[0035] Moreover, this resistance is 108 although surface electrical resistance on the back (primary imprint bias impression side) used what is 1011ohm** grade as a middle imprint belt 5 with the form of this operation as mentioned above. If it becomes below omega**, it will become primary imprint bias and this potential in the to some extent large range of middle imprint belt 5 tooth back by the side of primary imprint bias impression (the imprint blade 40, 41, and 42 side, 43 sides). Consequently, the book mentioned above since it acted on the range with the large electric field formed of the primary imprint bias impressed to the imprint blades 40, 41, 42, and 43

[0036] Therefore, it is the surface electrical resistance of middle imprint belt 5 tooth back by the side of primary imprint bias impression like the gestalt of this operation 108 It is carrying out to more than omega**, and is a book. In addition, the value which impressed and measured 100V with the high ohm-meter (; made from ADVANTEST R8340) was normalized and used for the surface-electrical-resistance value of middle imprint belt 5 tooth back by the side of the above-mentioned primary imprint bias impression using the measurement probe based on the JIS method K6911.

[0037] Moreover, a volume resistivity is 108 as mentioned above as imprint PUREDO. 40, 41, 42, and 43 with the form of this operation. Although what is omegacm grade was used, if the volume resistivity of the imprint blades 40, 41, 42, and 43 becomes more than 1012-ohmcm, primary imprint voltage required in order to secure sufficient primary imprint current will become a very high value. Consequently, since an expensive transformer and the cure against leak are needed, the cost rise of equipment will be caused.

[0038] Therefore, an expensive transformer and the cure against leak can suppress the cost rise of equipment in needlessness by using that whose volume resistivity of the imprint blades 40, 41, 42, and 43 is 101-1012-ohmcm like the form of this operation.

[0039] Thus, with the form of this operation, by using the imprint blades 40, 41, 42, and 43 of the tabular whose volume resistivity is 101-1012-ohmcm as a primary imprint bias impression

member, generating of unusual electric discharge near the primary imprint nip section N or exfoliation electric discharge can be suppressed, generating of a poor picture (a rough skin picture, a dot picture, a TORIASHI picture, etc.) can be prevented, and a quality picture can be acquired.

[0040] <Gestalt 2 of operation> As the gestalt of this operation shows to drawing 4 as a each primary imprint bias impression member of the image formation units 1, 2, 3, and 4, it is the composition using the conductive imprint sheet 45 which is about 0.5mm or less in thickness, and does not have rigidity, and other composition and image formation operation are the same as that of the conventional example shown in drawing 5, and the image formation equipment of the gestalt 1 of operation shown in drawing 1. In addition, the same sign is given to the same member as drawing 1 and the image formation equipment of the gestalt 1 of operation shown in 2, and the overlapping explanation is omitted.

[0041] As an imprint sheet 45, a PBT (polybutylene terephthalate) elastomer, a styrene system elastomer, or PVdF and PES (polyether sulfone) that carried out resistance adjustment can be used, for example. Moreover, also in the gestalt of this operation, resistance adjustment of the volume resistivity is carried out by the imprint sheet 45 like the gestalt 1 of operation at 10¹-10¹²-ohmcm.

[0042] As each imprint sheet 45 is shown in drawing 4 (drawing imprint sheet 45 of the image formation unit 1), it has fixed to the L character set iron 44 with the adhesives which carried out electric conduction processing, and the primary imprint bias power supply 13 is connected to the L character set iron 44. The primary imprint bias power supply 13 impresses the imprint bias of straight polarity to the L character set iron 44 with the gestalt of this operation.

[0043] Moreover, for the middle imprint belt 5, it sets in the gestalt of this operation as well as the gestalt 1 of operation, and surface electrical resistance is 10⁸. The thing more than omega** was used.

[0044] Although the point of the imprint sheet 45 which does not have rigidity in the primary imprint nip section contacts a photoconductor drum with the gestalt of the gestalt of this operation, the contact pressure at this time is about 5 g/cm.

[0045] On the other hand, in the case of the imprint roller (refer to drawing 7) of the above-mentioned conventional example, in order to make an imprint roller contact a photoconductor drum uniformly, the contact pressure to a photoconductor drum becomes high with the ends to a spring etc. about an imprint roller at a ***** sake. Therefore, although it is promoted and is easy to carry out extraction injury generating of the toner pseudo-** in the primary imprint nip section, since contact pressure to a photoconductor drum is small made by having used the imprint sheet 45 with the gestalt of this operation as mentioned above, the inside omission of the toner image in the primary imprint nip section etc. can be prevented.

[0046] Thus, with the gestalt of this operation, in addition to the effect acquired with the gestalt 1 of operation, the inside omission of the toner image in the primary imprint nip section etc. can be prevented, and a quality picture can be acquired.

[0047] Moreover, although it was the composition which forms a toner image in order of black, a Magenta, cyanogen, and yellow by the image formation units 1, 2, 3, and 4, the order of arrangement of the image formation units 1, 2, 3, and 4 is replaced, and you may make it pile up the toner image of each color one by one with the gestalt of each operation mentioned above.

[0048] Moreover, although it was image formation equipment equipped with two or more image formation units 1, 2, 3, and 4 with the gestalt of each operation mentioned above. Besides this, for example, the toner image of two or more colors formed one by one on one photoconductor drum this invention is applicable also to the primary imprint bias impression member of the image formation equipment which piles up in the primary imprint nip section, imprints the 1st order, bundles up in the secondary imprint nip section, imprints the 2nd order, and obtains a color picture.

[0049]

[Effect of the Invention] As explained above, when the volume resistivity consisted of plate-like part material by which resistance adjustment was carried out in the primary imprint bias impression member at 10¹-10¹²-ohmcm according to this invention and in which it has

elasticity, or a sheet-like member Since it becomes possible to make narrower than the case of the conventional imprint roller the range on which the electric field by the primary imprint bias in the primary imprint sections act, generating of ablation electric discharge near the primary imprint sections or unusual electric discharge can be prevented, and the quality picture with a poor picture which is not can be acquired.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The outline block diagram showing the image formation equipment concerning the gestalt 1 of operation.

[Drawing 2] The side elevation showing the imprint blade of the image formation equipment concerning the gestalt 1 of operation.

[Drawing 3] Drawing in which it is shown near the primary imprint nip section at the time of the primary imprint of the image formation equipment concerning the gestalt 1 of operation.

[Drawing 4] The side elevation showing the imprint sheet of the image formation equipment concerning the gestalt 2 of operation.

[Drawing 5] The outline block diagram showing the image formation equipment in the conventional example.

[Drawing 6] The outline block diagram showing the image formation unit of the image formation equipment in the conventional example.

[Drawing 7] Drawing in which it is shown near the primary imprint nip section at the time of the primary imprint of the image formation equipment of the conventional example.

[Description of Notations]

1, 2, 3, 4 Image formation unit

1a, 2a, 3a, 4a Photoconductor drum (image support)

5 Imprint Belt

13, 14, 15, 16 Primary imprint bias power supply

18 Secondary Imprint Roller

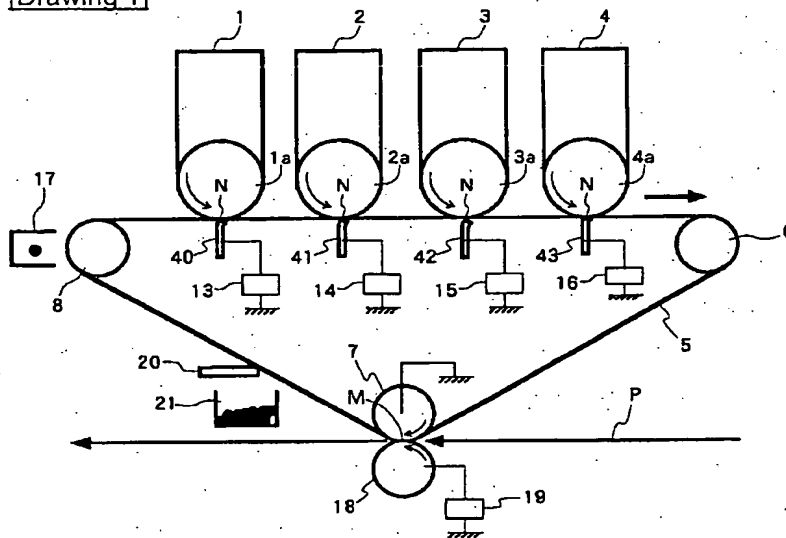
40, 41, 42, 43 Imprint blade (primary imprint bias impression member)

44 L Character Set Iron

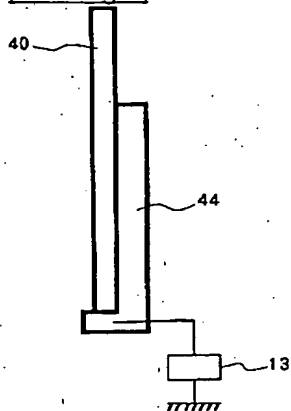
45 Imprint Sheet (Primary Imprint Bias Impression Member)

DRAWINGS

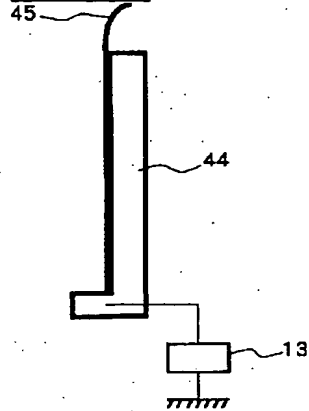
[Drawing 1]



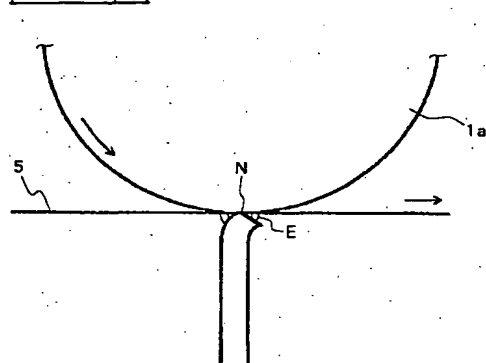
[Drawing 2]



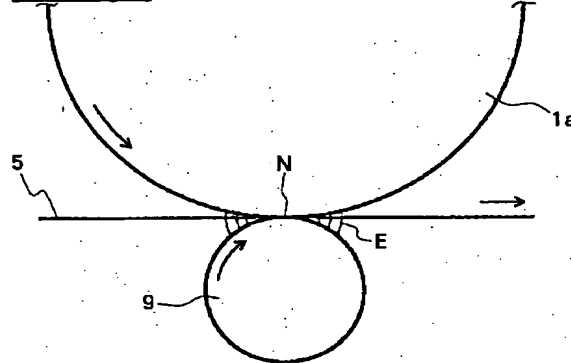
[Drawing 4]



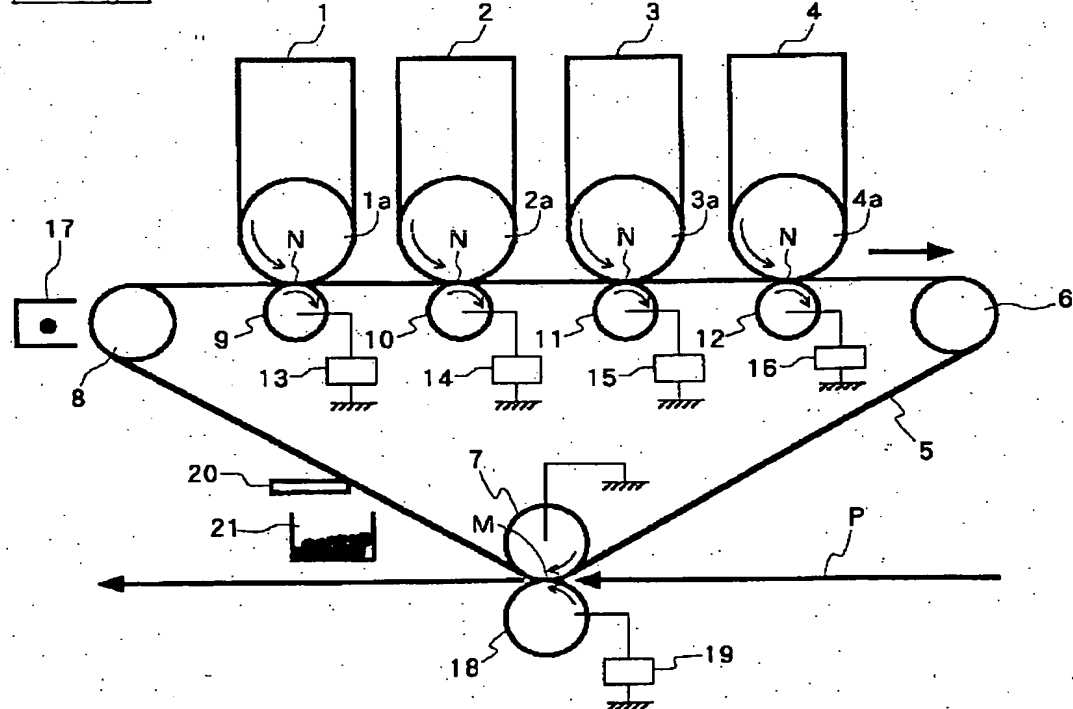
[Drawing 3]



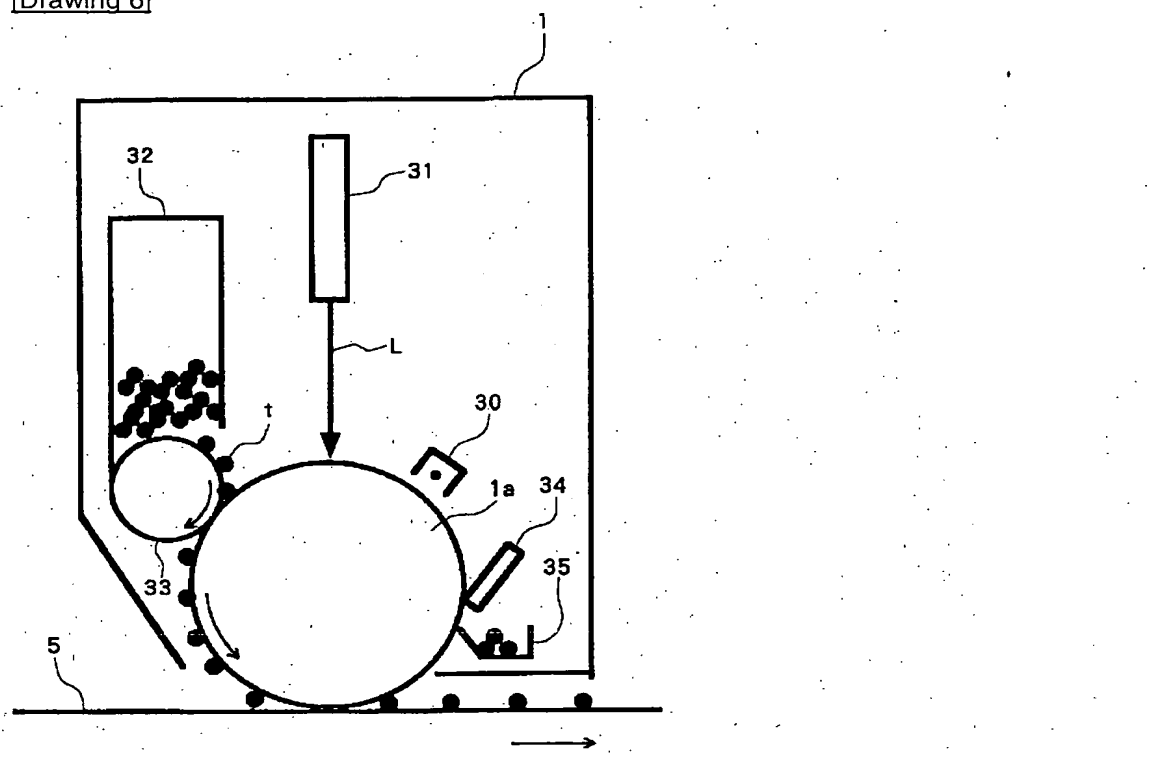
[Drawing 7]



[Drawing 5]



[Drawing 6]



[Translation done.]

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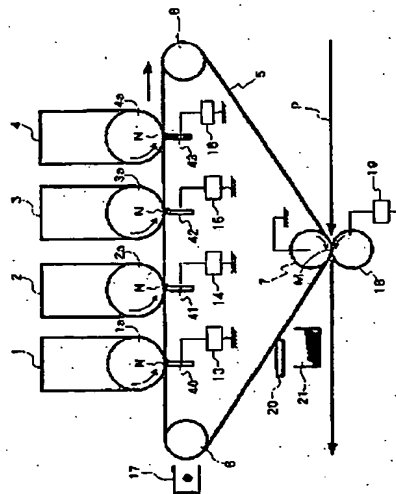
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(54) 【発明の名称】 画像形成装置

(57) 【要約】

【課題】 1次転写ニップ部での剥離放電や異常放電の発生を防止して、画像不良のない高画質な画像が得られるようにする。

【解決手段】 1次転写ニップ部Nにて中間転写ベルト5の背面側に当接して中間転写ベルト5の表面側を感光ドラム1a、1b、1c、1dに接触させて、中間転写ベルト5に1次転写バイアスを印加するための1次転写バイアス印加部材として、体積抵抗率が $1 \times 10^3 \sim 1 \times 10^{11} \Omega \cdot \text{cm}$ に抵抗調整された、弾性を有する板状の転写ブレード40a、41b、42c、43dを用いたことにより、1次転写ニップ部N近傍での1次転写バイアスによる電界が作用する範囲を狭くすることができるので、1次転写ニップ部Nでの剥離放電や異常放電の発生を防止して、画像不良のない高画質な画像を得ることができる。



部Nにて正極性の1次転写バイアスが印加された1次転写ローラ9により、回転される中間転写ベルト5上に1次転写される。1次転写後に感光ドラム1a上に残留している1次転写残トナーは1次転写クリーニングブレード34によって掻き落とされ、廃トナー容器35に回収される。

【0012】ブラックのトナー像が転写された中間転写ベルト5は、画像形成ユニット2側に回転される。画像形成ユニット2の感光ドラム2aにおいても、前記同様にして形成されたマゼンタのトナー像が中間転写ベルト5上のブラックのトナー像上に重ね合わせて1次転写ニップ部Nにて転写される。

【0013】以下、同様にして中間転写ベルト5上に直層転写されたブラック、マゼンタのトナー像上に、画像形成ユニット3、4の感光ドラム3a、4aで形成されたシアン、イエローのトナー像を順次重ね合わせて、フルカラーのトナー像を中間転写ベルト5上に形成する。

そして、所定のタイミングで2次転写ローラ18と中間転写ベルト5間の2次転写ニップ部Mに搬送される転写材P表面に、背面に接地感は適当なバイアスを印加した2次転写対向ローラ7を対向極とし、正極性の転写バイアスが印加された2次転写ローラ18によりフルカラーのトナー像が一括して2次転写される。

【0014】2次転写後に中間転写ベルト5上に残留している2次転写残トナーは2次転写クリーニングブレード20によって掻き落とされ、廃トナー容器21に回収される。また、中間転写ベルト5は、2次転写後に除電器17により除電され、次の画像形成動作に備える。

【0015】フルカラーのトナー像が形成された転写材Pは、定着装置（不図示）に搬送されて定着された後に外部に排出される。

【0016】

【発明が解決しようとする課題】ところで、上記した従来の画像形成装置のように、1次転写バイアスの印加部材として1次転写ローラ9、10、11、12を用いた場合、図7（図では画像形成ユニット1）に示すように、感光ドラム1aと当接する1次転写ニップ部N近傍の外に広い範囲で1次転写バイアスによる電界Eが作用する。また、1次転写ローラ9が中間転写ベルト5の裏面から徐々に離れるので、中間転写ベルト5の裏面との間で剝離放電が発生し易くなる。このため、この剝離放電の発生によって、中間転写ベルト5上に形成したトナー像が乱され、部分的にトナー像が凝集若しくは無くなる、いわゆる水玉画像やトリアシ画像等の画像不良となって現れてしまう。

【0017】更に、1次転写ローラ9への1次転写バイアスによる電界Eが1次転写ニップ部Nの外に広い範囲で作用しているために、感光ドラム1aと中間転写ベルト5表面が分能する空隙においてもこの電界Eが作用する。このため、この空隙での異常放電がこの電界Eに

よって助長され、この異常放電が起きた場所と起きなかった場所とで転写効率が異なってしまう、これがいわゆる模写画像などの画像不良となって現れてしまう。

【0018】また、上記した従来の画像形成装置のように、1次転写バイアスの印加部材として1次転写ローラ9、10、11、12を用いた場合、図7（図では画像形成ユニット1）に示すように、1次転写ニップ部Nにて1次転写ローラ9を感光ドラム1aに所定の付勢力で押圧して程度のニップ幅を得る必要がある。そのため、1次転写ニップ部Nでトナーが凝集され、いわゆる中抜け画像が発生し易くなる。

【0019】そこで本発明は、1次転写ニップ部近傍での剝離放電や異常放電の発生を防止し、また、1次転写ニップ部での1次転写バイアス印加部材と感光ドラム間の押圧を軽くして、画像不良のない良好な画像を得ることができる画像形成装置を提供することを目的とする。

【0020】

【課題を解決するための手段】上記目的を達成するために本発明は、像担持体上に形成したトナー像を1次転写部にて無電位の中間転写ベルトに1次転写し、該中間転写ベルト上の前記トナー像を2次転写部にて転写材に2次転写して画像形成を行う画像形成装置において、前記1次転写部にて前記中間転写ベルトの背面側に当接して該中間転写ベルトの表面側を前記像担持体に接触させて、前記中間転写ベルトに1次転写バイアスを印加するための1次転写バイアス印加部材を備え、前記1次転写バイアス印加部材は、体積抵抗率が $10^7 \sim 10^{11} \Omega \cdot \text{cm}$ に抵抗調整された、弾性を有する軟状部材又はシート状部材で構成されていることを特徴としている。

【0021】また、前記1次転写バイアス印加部材と当接する前記中間転写ベルトの背面側の表面抵抗が $10^4 \Omega/\square$ 以上である、ことを特徴とする請求項1記載の画像形成装置。

【0022】また、1つの前記像担持体上に複数色のトナー像を順次形成して、1次転写部にて前記1次転写バイアス印加部材に1次転写バイアスを印加して前記中間転写ベルト上に前記複数色のトナー像を順次1次転写して重ね合わせ、重ね合わされた前記複数色のトナー像を2次転写部にて一括して転写材に2次転写することを特徴としている。

【0023】また、表面に画像情報に応じた任意の色の静電潜像を担持する前記像担持体と、前記静電潜像をトナー像として現像する現像手段とを少なくとも備えた画像形成ユニットを複数有し、前記各画像形成ユニットの前記各像担持体を一列に配置し、前記各像担持体を1次転写部にて前記中間転写ベルトの表面側にそれぞれ当接させて、前記各像担持体にそれぞれ形成された異なる色のトナー像を、前記各像担持体の前記1次転写部にて前記1次転写バイアス印加部材に1次転写バイアスを印加して前記中間転写ベルト上に順次重ね合わせて1次転写

ることにより、1次転写ニップ部N近傍での異常放電や剝離放電の発生を抑えて、画像不良（絞肌画像、水玉画像やトリアシ画像等）の発生を防止し、高品質な画像を得ることができる。

【0040】（実施の形態2）本実施の形態では、画像形成ユニット1、2、3、4の各1次転写バイアス印加部材として図4に示すように、厚さ0.5mm程度以下で剛性の低い導電性の転写シート45を用いた構成であり、他の構成及び画像形成動作は図5に示した従来例、及び図1に示した実施の形態1の画像形成装置と同様である。なお、図1、2に示した実施の形態1の画像形成装置と同一部材には同一符号を付し、重複する説明は省略する。

【0041】転写シート45としては、例えば、PBT（ポリブチレンテレフタレート）エラストマーやスチレン系エラストマー、若しくは抵抗調整したPVdFやPES（ポリエーテルスルホン）を用いることができる。また、本実施の形態においても、転写シート45は、実施の形態1と同様に体積抵抗率が $10^3 \sim 10^{11} \Omega \text{cm}$ に抵抗調整されている。

【0042】各転写シート45は、図4（図では画像形成ユニット1の転写シート45）に示すように、L字型板金44に導電処理した接着剤により固着されており、L字型板金44には1次転写バイアス電源13が接続されている。1次転写バイアス電源13は、本実施の形態ではL字型板金44に正極性の転写バイアスを印加する。

【0043】また、中間転写ベルト5は、本実施の形態においても、実施の形態1と同様に表面抵抗が $10^4 \Omega \square$ 以上のものを用いた。

【0044】本実施の形態の形態では、1次転写ニップ部にて剛性の低い転写シート45の先端部が感光ドラムに当接するが、この時の当接圧は約5g/cmである。

【0045】一方、上記した従来例の転写ローラ（図7参照）の場合では、転写ローラを感光ドラムに均一に当接させるために、転写ローラをその両端からバネ等で付勢するために、感光ドラムに対する当接圧が高くなる。そのため、1次転写ニップ部でのトナー搬送が助長され、中抜けが発生し易いが、上述したように本実施の形態では転写シート45を用いたことにより、感光ドラムに対する当接圧が小さくできるので、1次転写ニップ部でのトナー像の中抜け等を防止することができる。

【0046】このように本実施の形態では、実施の形態1で得られる効果以外に、1次転写ニップ部でのトナー像の中抜け等を防止して、高品質な画像を得ることができる。

【0047】また、上述した各実施の形態では、画像形成ユニット1、2、3、4によってブラック、マゼン

タ、シアン、イエローの順にトナー像を形成する構成であったが、画像形成ユニット1、2、3、4の配列順を入れ替えて各色のトナー像を順次重ね合わせるようにしてもよい。

【0048】また、上述した各実施の形態では、複数の画像形成ユニット1、2、3、4を備えた画像形成装置であったが、これ以外にも、例えば1つの感光ドラム上に順次形成される複数色のトナー像を、1次転写ニップ部にて重ね合わせて1次転写して2次転写ニップ部にて一括して2次転写してカラー画像を得る画像形成装置の1次転写バイアス印加部材にも、本発明を適用することができる。

【0049】

【発明の効果】以上説明したように本発明によれば、1次転写バイアス印加部材を、体積抵抗率が $10^3 \sim 10^{11} \Omega \text{cm}$ に抵抗調整された、弾性を有する板状部材又はシート状部材で構成したことによって、1次転写部での1次転写バイアスによる電界が作用する範囲を従来の転写ローラの場合よりも狭くすることが可能となるので、1次転写部近傍での剝離放電や異常放電の発生を防止して、画像不良のない高品質な画像を得ることができる。

【図面の簡単な説明】

【図1】本発明の実施の形態1に係る画像形成装置を示す概略構成図。

【図2】実施の形態1に係る画像形成装置の転写ブレードを示す側面図。

【図3】実施の形態1に係る画像形成装置の1次転写時における1次転写ニップ部近傍を示す図。

【図4】実施の形態2に係る画像形成装置の転写シートを示す側面図。

【図5】従来例における画像形成装置を示す概略構成図。

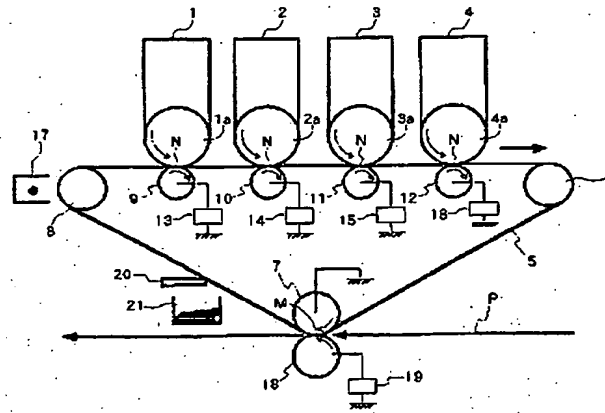
【図6】従来例における画像形成装置の画像形成ユニットを示す概略構成図。

【図7】従来例の画像形成装置の1次転写時における1次転写ニップ部近傍を示す図。

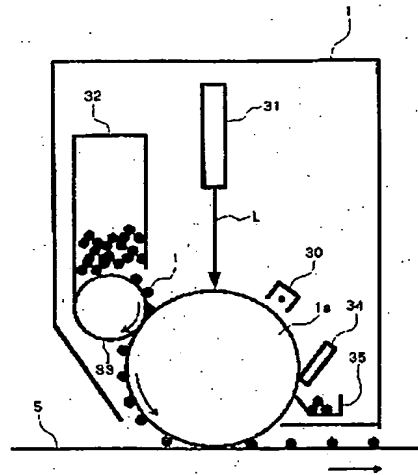
【符号の説明】

| | |
|-------------|----------------------|
| 1、2、3、4 | 画像形成ユニット |
| 1a、2a、3a、4a | 感光ドラム（像担持体） |
| 5 | 転写ベルト |
| 13、14、15、16 | 1次転写バイアス電源 |
| 18 | 2次転写ローラ |
| 40、41、42、43 | 転写ブレード（1次転写バイアス印加部材） |
| 44 | L字型板金 |
| 45 | 転写シート（1次転写バイアス印加部材） |

【図5】



【図6】



フロントページの続き

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